PLANT DISEASE NOTES.

CEREALS AND GRASSES.

DISEASES OF WHEAT IN N.S.W., 1950 SEASON:

Over wide areas in the northern half of the N.S.W. wheat belt, greatly reduced yield and poor quality grain have resulted from the combined effects of very heavy winter rain and fairly high incidence of plant diseases.

Of the factors contributing to the position, the greatly reduced green leaf area noted in many crops early in the season must be considered as important. While some yellowing must be attributed to the wet conditions, the incidence of the leaf blights and spot organisms, as Septoria tritici, and to a lesser extent, S. nodorum and Helminthosporium spp. was high. There was a notable decrease in the amount of leaf rust as determined in the rust survey, and this was borne out by the paucity of uredospores obtained in spore traps exposed in the north-west.

Footrots caused by Helminthosporium sp. of the H. sativum type, and the take-all organism, Ophiobolus graminis, contributed to the disease complex. Take-all occurred as far north as Spring Ridge and Baan Baa. As some of the areas carrying wheat were under water for considerable periods, physiological "drowning" must have also occurred. Some frost damage was noted in early maturing crops, although the winter generally was mild.

Odd plants with Loose smut, Ustilago tritici, were present in some crops, and Downy mildew, Sclerospora macrospora, was noted from a few areas. Glume blotches, caused mainly by Septoria nodorum, were prevalent, and Basal glume rot (Pseudomonas atrofaciens) and some Fusarium head infection occurred to a lesser extent. Nodal attack by Septoria nodorum, culminating in severe "node-breaking" occurred in some areas.

Melanism in varieties as Warigo and Hofed occurred as usual, particularly on the stem below the upper node. Some other varieties and Hope hybrids also showed the condition in the Sydney University plots at the University, Castle Hill, Richmond, Curlewis and at Narrabri.

By the time of harvest, the leaves, and to a less extent the heads, were, in many cases, supporting a large population of saprophytic fungi, bacteria and other organisms.

Grain samples showed a high proportion of smudge or black point, and of grain with pink discolourations. Much pinched, bleached and shot grain also occurred, particularly in the north-west and central-west of the wheat belt.

- W.L. WATERHOUSE and D. SHAW.

SPECKLED LEAF BLIGHT OF WHEAT:

S. tritici was reported in the A.P.D.R. 2:4:46, 1950, as being very widespread in New South Wales and causing considerable damage in parts.

While most of the blighted leaves, towards the end of this very wet season, have been covered with saprophytes, it has been possible to confirm observations made last season, that the occurrence of micropycnidiospores is extremely widespread, and for these two seasons at least, must be regarded as usual rather than the exception.

Also confirmed were observations made last season that parts of the plant other than leaves could be infected. Stems and glumes carrying pycnidia, with microspores in the first instance, and macro- and micro-spores in the second, have been identified.

S. tritici has long been recorded in most of the States. In January 1948, the writer collected diseased plants in Tasmania not far from Hobart, and Mr. Wade has since kindly forwarded specimens each season. In September this year S. tritici was identified on rusted material sent from Toowoomba, Queensland.

The writer has been in correspondence with the C.M.I. regarding the authority for the name S. tritici. Weber credited Desmazières, but Sprague credited Roberge, to whom Desmazières credited the name. After examining the original papers and the Kew specimen which Roberge sent to Berkeley, Dr. Bisby reported that "it seems safe to assume.... that he (Roberge) sent a collection to Desmazières (perhaps with notes) and Desmazières wrote up the description and credited the name to Roberge, the collector. So I think it should be S. tritici Desm. for ordinary citation, as Saccardo and others have it." Dr. Wiltshire has also noted that "in the 'List of

Common British Plant Disease' to which we are committed, the citation is S. tritici Rob. & Desm. This will now have to be considered by the Plant Pathology Committee of the B.M.S."

- D. SHAW.

SEPTORIA NODORUM:

As reported in the A.P.D.R. 2:4:46, 1950, S. nodorum was showing up in August in the North-west of N.S.W. Subsequent examination of specimens and of crops in the field have shown that the fungus is extremely widespread, being present in every crop examined, and in many cases causing considerable damage. Many specimens from the central-west were heavily infected also.

Blotching of glumes and lemmas (which is easier to detect when the heads are still green) occurred in most crops, some being only slightly affected, others with blotches and pycnidia on most of the heads. Attack on the nodes appeared even more widespread than glume attack. Pycnidia were abundant, with puckering at the nodes causing angles in the stem, and severe "node-breaking" occurred in many crops. All nodes appeared equally susceptible, although the lowest were usually without pycnidia. Some nodes, even though intact, were so brittle that a slight pull at the top of the plant caused immediate breaking. Difficulty was experienced in harvesting crops having a high percentage of plants with broken nodes, as they could not be picked up as is usually done with lodged crops.

S. nodorum, on glumes, stems and nodes, was present on specimens from the coastal region, at Richmond, Castle Hill and the plots at the University. This organism has also long been recorded in most of the States. It has been identified on rust material sent from Tasmania in January, 1950, and on material sent from Queensland in March, 1950.

Weather conditions over the northern part of the wheat belt favoured this pathogen particularly. Not only was the rainfall for 1950 high, (44" at Gunnedah up till the end of November, as against 22" average for the preceding 5 years), but the incidence was such that there were no long periods without rain; 14 days being the longest interval. This is important considering the role water plays in the liberation, dissemination and germination of the spores. No severe frosts (below 32°F) occurred at Gunnedah during 1950, whereas the average for the past 10 years is 24 severe frosts per year. Eleven light

frosts (32-36°F) occurred as against 8 per year (average for 10 years). The mean minimum temperatures for April, May, June, July and August were higher than those for the corresponding months in the past 5 years.

No variety in the field was found to be resistant, although a few appeared to be more susceptible than others. Field reaction is being compared with seedling reaction in glasshouse tests.

- D. SHAW.

GLUME BLOTCH OF WHEAT:

The most important wheat pathogen in N.S.W. this season has been Septoria nodorum. A survey which is being conducted with the assistance of District Agronomists of the N.S.W. Department of Agriculture indicates that the disease has caused the loss of several million bushels of grain. In some cases there has been total loss of crop, particularly in paddocks where drainage was poor. In addition to the glumes, nodes and internodes were attacked in varying degrees and culms were often ringbarked at the nodes. In some cases the disease caused stem-breaking and lodging.

There is no previous official record of the disease having been as destructive in N.S.W. During the season losses from stem and leaf rusts have been relatively light in comparison, but heavy foliar losses appear to have been caused throughout the wheat belt by S. tritici. The Spring was very wet and relatively cool in most districts.

Reports from Agronomists indicate that varieties showed different susceptibilities to S. nodorum but these were, however, not constant. Allowing for this, in the most susceptible group are Bobin, Celebration, Gabo, Kendee, Koala, Warigo and Yalta and, in the least susceptible, Bencubbin, Bordan, Ford and Glenwari.

- C. J. MAGEE.

FIELD AND FODDER CROPS.

PASMO DISEASE OF LINSEED. (SPHAERELLA LINORUM.):

Pasmo is now general throughout the linseed crops in the North-west of N.S.W., and lesions on leaves, stems and bolls are common. This season a condition of "collar-rot" leading to lodging was reported from this area. Many stands showed odd lodged plants, and some crops, it was estimated, were affected up to 85%.

Examination of diseased plants showed that in some cases longitudinal cracking of the outer stem tissues above the "collar-rot" region for a distance of 1-2" had occurred. The cracks were up to ½" in length, and of varying depths, involving the epidermis and outer parenchyma. The "collar-rot" region extended from just above soil level, and most specimens showed abundant pycnidia over the rotted area. Platings of the collar region not showing pycnidia yielded S. linorum, Fusarium sp., Alternaria spp., Trichoderma sp., and bacteria. A few specimens received from the field were crusted with Fusarium sp. at the base, but neither the spores from these, nor the Fusarium sp. obtained from the platings, proved pathogenic when tested on seedlings in the glasshouse.

Preliminary tests in the glasshouse have shown that seedlings sprayed at soil level with a heavy concentration of spores of S. linorum, when the soil was kept continually moist, produced a distinct rotted area at the base of the plant. In a few cases, cracks occurred above this region. From the evidence so far obtained, it appears as if the "collar-rot" condition and subsequent lodging, could be caused by S. linorum under the extremely wet conditions which prevailed in the north-west this year.

Brentzel (Jour.Agr. Res. 32:1:25-37, 1926) recorded that "when an application of infested straw was used as inoculum in experimental plots very severe infection developed.... Some time before the mottled appearance occurred, large lesions developed on the stems at the soil line. Many of the plants bent and in some cases broke over at these points. This condition resulting from the disease has not been observed in the field."

It is also noted that McKnight (A.P.D.R. 2:2:2, 1950) recorded rare instances of infected plants lodging in Queensland in 1949, and that Millikan (A.P.D.R. 2:1:3, 1950) recorded the occurrence of a Septoria sp. (differing from S. linorum) on lodged flax straw in Victoria.

We would be interested to hear of any further experience by these workers, and others, on this subject.

- H.B. KERR and D. SHAW.

LODGING AND STEM SPLITTING OF LINSEED:

Linseed plants in 30-35% of the acreage planted in North-Western New South Wales lodged during the past season. Crops sown in April were very lightly affected; crops sown in late May - early June were extensively lodged (cases of up to 95% lodging being seen) while those sown in August were, at the most, very lightly affected.

When observed in November the stems of lodged plants, at ground level and for about one inch above, were mostly, though not always, abnormally thickened and were showing a longtitudinal splitting of the outer tissues. Root development was sometimes restricted.

The official rainfall registration at Moree was 14.89 in. for June - July of which 9.87 in. fell in July. Little rain fell in May or August. The average rainfall at Moree for June and July is 1.99 in. and 1.44 in. respectively (C.S.I.R. Pamphlet No. 42).

Of the May - June sowings those which were most severely lodged were on the heaviest soils in the district, but near rivers or streams, where the drainage was better, the degree of lodging was reduced. On one crop at Gravesend on contour-drained land the greatest amount of lodging and stem splitting had occurred in plants growing in the vicinity of the contour banks where water had accumulated during July.

The only noticeable lodging in April sown crops occurred where delayed germination or damage by rabbits had caused the amount of growth reached in July to equal to that of the May - June plantings.

Isolations from stems of lodged plants invariably yielded Rhizoctonia sp. The presence of this fungus in affected stems suggests some activity of a damping-off nature, which, together with waterlogging in July, weakened the stem but did not result in immediate lodging. However, by mid-September, when bolling had commenced, the weakened lower stem could no longer support the increasing top weight and plants began to lodge.

Pathogenicity tests will be conducted with these isolates.

- R.J. CONROY.

VEGETABLES.

XANTHOMONAS VESICATORIA ON TOMATOES:

This disease has been known in Tasmania for a number of years, but this year the incidence on seedling tomatoes has been higher than usual. The affected seedlings were severely affected and the lesions occupied a considerable proportion of the leaf surface.

- G.C. WADE.

A POSSIBLE ALTERNATE HOST OF CORYNEBACTERIUM MICHIGANENSE:

During an inspection of a field of tomatoes at Cowra in March, 1950, a small percentage of plants was found to be infected by bacterial canker. Since seed history, seed treatment and plot history was considered to be satisfactory, a search was made for possible weed hosts of the pathogen.

A single plant of Solanum nigrum was observed to be in a wilted condition and at one node a single necrotic area of restricted size occurred within the stem. A bacterium isolated from this plant conformed in cultural characteristics with Corynebacterium michigananse and caused symptoms identical with those of bacterial canker when inoculated into tomato.

It would therefore appear that C. michiganense is capable of carrying over on S. nigrum. Pathogenicity tests on Solanum spp. will be undertaken.

- W.S. SUTTON

DELAYED INCIDENCE OF SPOTTED WILT OF TOMATOES:

Biological Branch records show that in previous years there have always been reports of the spotted wilt disease in tomatoes before or during the second week in October and that the first major peak incidence occurs about mid-November. This season the first record of spotted wilt of tomato was made on 19th November. Up to the time of writing (18/12/50) there is no sign of any increase in incidence even in areas where severe losses are normally experienced by this date.

Mr. G. Pasfield, Entomologist, has found that the population of Thrips (all species) on weed hosts surrounding tomato crops is much the same as for the corresponding period last year when the incidence of spotted wilt was higher.

- W.S. SUTTON.

BEAN RUST:

Bean rust (Uromyces phaseoli) has caused considerable damage to Queensland crops during the winter season, and is still flourishing on crops in the metropolitan area. A specimen collected at Rochedale was identified by Professor W.L. Waterhouse, as the race which attacks dwarf beans. This strain is already widespread throughout the southern part of the State. Severely infected crops have been observed as far north as Rockhampton. Varieties so far seen to be affected are Brown Beauty, New Beauty, Clarendon Wonder and Stayley's Surprise.

- J.C. JOHNSON.

PSEUDOMONAS SYRINGAE ON BEANS:

The two bacterial diseases of beans, halo blight (Pseudomonas medicaginis var. phaseolicola) and common blight (Xanthomonas phaseoli) have been recorded in Queensland for many years. Although it is suspected that bacterial brown spot (Pseudomonas syringae) has also been present, it is only recently that it has been definitely determined. The disease is probably widespread throughout the bean producing areas of the State but is unlikely to become troublesome.

- P. TRIGGE.

SPORING OF ASCOCHYTA PISI IN CULTURE:

Isolates of Ascochyta pisi have behaved differently in the readiness with which they produce spores on artificial cultural media.

Of twelve isolates studied at Canberra, two readily formed pycnospores on potato dextrose agar, oatmeal agar and peameal agar, and this production of spores was hastened by exposure of well-grown cultures to daylight. In this respect, continuous exposure to fluorescent lighting was found to be less effective than exposure to normal daylight during the daylight hours.

Three other isolates spored readily when grown on boiled pea vines and exposed to daylight.

The other isolates tested spored spasmodically, an occasional culture producing pycnospores after prolonged exposure to light.

Sporing was not encouraged by the incorporation of pea or bean extracts into the agar media.

- D.C. WARK.

FRUIT.

PINK DISEASE IN CITRUS:

Corticium salmonicolor has not, in the past, proved to be a pathogen of much significance in N.S.W., but during the abnormally wet conditions of the last few years it appears to have become well established and is causing severe damage to Washington Navel and Valencia orange trees in a few orchards in the Bellengen River district of the North Coast.

Specimens received from one orchard, which is in a sheltered, humid situation, demonstrated a method which enables this fungus to invade a considerable length of branch tissue simultaneously from a large number of points on an external mycelium. A silvery cobweb growth of superficial mycelium, with rows of pale pink pustules extended along the branches for 1 to 2 feet beyond the infected tissue. Sections made of pustules on a number of branches showed that each of them became a centre for the direct entry of the fungus into the cortical

tissue. The youngest pustules were more or less homogeneous fungus psendo parenchyma. Sections of older pustules showed the development of a core of densely protoplasmic cells which became differentiated into a definite growing point; a strand of hyphae in the centre of the pustule adjacent to the bark surface and elongating at right angles to it. This strand penetrated the bark and the hyphae fanned out into the tissue beneath, rapidly invading all parts of the branch. This type of growth could only occur under conditions of high humidity.

- L.R. FRASER.

BROWN ROT OF CITRUS:

During April, 1950 considerable development of brown rot on Washington Navel oranges took place throughout the Gosford district. In every case where samples were obtained, the pathogen was found to be Phytophthora citrophthora.

Brown rot development on the fruit was observed to be worst where fowls were ranged in the orchard. This did not appear to have any relationship with the degree of grass and weed cover on the orchard, which might interfere with the air borne distribution of zoosporangia developed at ground level. On one orchard where fowls have been ranged for the last four years, considerable brown rot development took place in a block of Washington Navel orange trees on Rough Lemon stock. These trees were remarkable for their vigour and fruitfulness, and an examination of the roots failed to reveal any rot of consequence, either on the fibrous or structural root systems.

Infection of fruit did not appear to be related to the degree of root infection by P. citrophthora for, in some cases brown rot development took place in very healthy blocks of trees, yet many unthrifty blocks were known throughout the district where active root rotting was taking place, but in which little or no brown rot occurred.

The degree of brown rot development was extremely variable in any chosen block of trees. Generally losses might vary from six to several dozen fruit per tree, usually on the lower branches, but occasionally a tree would sustain the loss of its entire crop.

Brown rot was observed attacking the fruit on eighteen-year-old Washington Navel orange trees growing in new citrus land on Trifoliata stocks. The trees were in excellent condition and their root systems, as would be expected were

quite free from any infection by P. citrophthora. This infection of the fruit, which has also occurred in other years on these trees, indicates that the organism is able to become established and survive as a saprophyte in some of our coastal citrus soils at least. The possibility of P. citrophthora being indegenous in some localities should not be overlooked.

- T.B. KIELY.

BORON DEFICIENCY IN CITRUS:

Boron deficiency is well known in a number of districts in N.S.W., particularly as affecting pome fruit, but it has not previously been suspected in citrus.

An instance of what is probably boron deficiency has been seen this season in Thompson grapefruit grown at Narromine on the Central Western Slopes.

Only the fruit are affected, and so far only a small percentage of trees of the total planting is involved. The symptoms are closely similar to those described from Florida and South Africa. The rind is abnormally hard, and somewhat lumpy, and in section brown gum-impregnated tissue can be seen in the albedo, occurring in bands, irregular pockets, or more diffuse patches. In Florida boron deficiency is suspected of being associated with poor fruit set, and the lumpy rind and gum spot symptoms only develop under conditions of severe deficiency.

- L.R. FRASER.

BLACK SPOT OF APPLES:

Due to climatic conditions leaf and early fruit infection was more serious than usual in apples last season. Ascospore discharge occurred about half way between the "pink" and "calyx" stages. Therefore, the trees were exposed to infection when they were not adequately protected with fungicides. Weather at that period was cool and humid, so that heavy infection occurred.

Experimental work was conducted to test the relative value of schedules incorporating some of the newer fungicies developed overseas and schedules based on local materials. The following is a summary of the conclusions.

The fungicide "Phygon" (2:3 dichlor, 1:4 naphthoquinone) (1 lb. in 80 gals.) gave excellent control of both leaf and fruit infection and was significantly better than any other material tested. However, it caused slightly more russet than other fungicides. T.M.T.D. (tetra methyl thiuram disulphide) 2½ lb. per 100 gallons, and "Fermate" (ferric dimethyl dithio carbamate) gave better control of fruit infection than any of the schedules utilising lime sulphur and colloidal sulphur. However, leaf infection was as severe as with schedules using lime sulphur throughout (1 in 20 at pink, followed by 1 in 80 at calyx and for cover sprays), or lime sulphur at pink followed by colloidal sulphur (3 lb. per 100 gals.) T.M.T.D. and "Fermate" caused less russet than sulphur schedules. Lime sulphur throughout and lime sulphur at pink and calyx followed by colloidal sulphur gave equally satisfactory control, but substitution of colloidal sulphur for lime sulphur at the calyx increased fruit infection.

Puratised Mercury E (Phenyl mercuric tri ethanolamine lactate) at green tip and pink stages, gave inferior results to 6:4:40 Bordeaux at green tip followed by 1 in 40 lime sulphur at the calyx.

- G. C. WADE.

SEASONAL DEVELOPMENT OF GRAPE DISEASES:

The epiphytotic of downy mildew which developed during the Spring in N.S.W. promises to exceed in severity that of the previous season. The first mildew affected leaves were found in the Hunter River Valley towards the end of September; the earliest appearance recorded. Shortly afterwards the disease was reported from the Central-Western districts at Orange and Molong. Weather conditions during the Spring greatly hampered spraying operations and a much reduced harvest is expected.

Black spot and downy mildew have again this season caused great damage to vines in the North-West and Western districts where the season has been unusually humid.

- L.R. FRASER.

A PYTHIACEOUS FUNGUS ISOLATED FROM SULTANA VINES:

In February 1950, a fungus was isolated from Sultana vines, grown at Redcliffs, Victoria, which may be referred to the genus Pythium or to Phytophthora; its identity has not been further determined.

The vineyard from which this isolation was made, was planted in 1922, and is in excellent condition, apart from the fact that, during the past 4 years, 20 vines (18 sultana and 2 currant) have died from "causes unknown".

Usually no preliminary symptoms are observed, the buds simply fail to burst in the spring; sometimes however, the vines grow weakly for one season and die the next. Although the behaviour of these vines bears considerable resemblance to the condition known as "dying vines", the usual "collar rot" symptoms have not been observed.

Isolations on Potato Dextrose Agar were made from three vines as listed below:-

A. Butt of a vine which failed to burst in Spring, 1949.

B. Butt of a vine which had grown only weakly that season.

C. Butt of a vine growing near B, but showing only very slight signs of weakness.

The same fungus, i.e. Pythium sp. or Phytophthora sp. was isolated consistently from specimens A. & B., but not from C.

Pathogenicity tests were carried out in October, 1950, using 15 well-established vine cuttings, which were grown in soil-temperature tanks at approximately 28°C. Ten of these cuttings were inoculated with the fungus and five were left as control plants.

A "T" shaped incision was made in each cane, a few inches above soil level, and inoculum (grown for three days on P.D.A. at 28°C) introduced to ten plants.

Six days later, a shoot on one of the inoculated vines died and the fungus was re-isolated from it.

It is possible that the pathogenicity of this fungus diminished during the 8 months, that it was in culture. It is proposed therefore, to repeat these pathogenicity tests using a fresh isolate.

- EILEEN E. FISHER.

SPUR BLIGHT OF RASPBERRIES:

In the last issue of this publication (A.P.D.R. 2:4:52, 1950) it was reported that spur blight was responsible for severe damage to raspberry crops in Tasmania. It was then stated that the perfect stage had not been found.

Since that date further material has been examined, and the perfect stage of Didymella applanata was found on infected canes on the 14th November, and has recently been noted on other material.

It is difficult to assess the precise effect of the disease, but many plantations have become uneconomic primarily through spur blight, and it is probably conservative to suggest a loss of 20% as a common occurrence in all Tasmanian raspberry growing districts.

- G.C. WADE.

WHITE ROOT ROT OF RASPBERRIES:

A disease due to an unidentified fungus which remains sterile in culture, has been known to cause losses in Victoria for many years, where it has been referred to as white root rot. The characteristic feature is a conspicuous growth of white mycelium over the roots of infected plants. This disease has recently been detected on one plantation of Lloyd George raspberries in the Molesworth district of Tasmania, and this is thought to be the first record of the disease outside Victoria.

It occurred in a dry, exposed section of the plantation, and the more favoured areas were free from the disease.

- G.C. WADE.

CYTOSPORA SP. ASSOCIATED WITH "DIE-BACK" OF WALNUT:

In recent months, a "die-back" of walnut, with which a species of Cytospora was associated, has been reported from Berwick. This fungus is closely related to the species C. juglandina but the conidia, which measure 6-9 μ x 1.5-2 μ are slightly larger than those originally described for that species. Cytospora sp. has not been previously recorded on walnuts in Australia, but C. juglandina and an unnamed species of Cytospora have been associated with die-back of walnuts in England and India, respectively.

In none of these instances, however, has the pathogenicity of the fungus been determined and it is possible that it only attacks the dead or dying twigs of debilitated trees. The fact that the Berwick tree also showed symptoms of bacterial blight tends to confirm this view.

- EILEEN E. FISHER.

DEATH OF DECIDUOUS FRUIT TREES:

Most fruitgrowing districts in N.S.W. registered record rainfall figures for 1950 and most trees were subjected to varying degrees of waterlogging from March to November. Many thousands of such trees failed to burst into leaf this spring and thousands more have died subsequently.

Peaches and nectarines have suffered most heavily and in the majority of orchards, were the first to die. Subsequently cherry trees (some as old as fifty years), have died in the wetter situations, and also many apple trees. Plum trees on peach stock generally failed to come into leaf but plums on plum stock have not been so severely damaged. Pear trees generally are not yet showing any marked signs of distress.

The full extent of the damage is not yet clear, but judging from the degree of injury which has occurred on the lower roots, it appears that many more trees will succumb during the first prolonged dry spell.

All attempts to isolate a pathogen from the dying roots of affected trees have failed and, until such time as a pathogen can be isolated, death must be attributed to the effect of prolonged waterlogging on root physiology, although, as reported earlier (A.P.D.R. 1:4:56, 1949), Phytophthora cinnamomi has been isolated from the roots of nursery peach trees dying in water-logged soil in a Sydney Metropolitan Nursery.

- K.E. HUTTON.

MISCELLANEOUS NOTES.

DISSEMINATION PATTERN OF A VIRUS DISEASE:

The writer recently visited a group of Manila hemp (Musa textilis) estates in North Borneo which, during the past ten years, have become affected with the virus disease bunchy-top. The only known vector of this disease is the aphid, Pentalonia nigronervosa, which has only weak powers of flight but apparently may be carried by air currents over wide distances.

The estates consist of clearings of one to several thousands of acres in the jungle and are separated from one another by a few to 20 miles. The history of the disease outbreak suggests that the disease spread by the movement of wind-borne infective aphids from one estate to the other. Where evidence is available, it seems that, on entering an estate, the disease first established itself near the jungle margin and then spread first into portions of the estate close to the edge or "wall" of the jungle. The direction of spread thus tended to be around the edge of the jungle, giving a disease dispersion pattern and disease gradient of an unexpected type, or certainly not one which would have arisen by eddy diffusion of the vector when air-borne. It is considered possible that turbulence in the air flow near the "wall" of the jungle may have been responsible for the deposition of "showers" of infective aphids near the jungle edge and caused the marginal development of the disease. It is not considered likely that wild hosts in the jungle contibute to the observed spatial distribution of the disease.

- C.J. MAGEE.

USE OF THE WORDS "RESISTANCE" AND "TOLERANCE":

In the previous issue of this publication (A.P.D.R. 2:4:54, 1950), N.H. White discusses the use of the words resistance, resistant, tolerance, tolerant and susceptible.

Surely, Dr. White's interpretation of the meaning of the adjective resistant is that commonly given by plant pathologists to "immune". Quoting from one of the references (Trans. Brit. Mycol. Soc. 33:154-160., 1950) given by Dr. White, immune is there defined as "Exempt from infection"; resistant as "Possessing qualities that hinder the development of a given disease"; tolerant as "Able to endure infection by a particular

pathogen, without showing severe disease"; and susceptible as "Non-immune". The word resistant is one which is commonly used in a relative or comparative sense and may refer both to a plant or variety which is immune and also to one which can be infected by the pathogen, but which, in comparison with some other plant or variety, possesses some disease-hindering quality or qualities. Let us consider three plants or varieties A, B and C such that, under a given set of environmental conditions, A cannot be infected by pathogen X, whilst B and C can be infected by this pathogen, with B showing mild disease symptoms and C severe symptoms. The plant or variety B would be termed resistant if compared with C and susceptible if compared with A. In the writer's opinion, the use of the word tolerant implies that the plant or variety so designated possesses a measure of both susceptibility and resistance - susceptibility because it is obviously not immune to infection, and resistant because, being tolerant, it must have some disease-hindering quality or qualities in order to prevent the manifestation of severe disease.

- R.D. WILSON.

COMMONWEALTH MYCOLOGICAL INSTITUTE NOTES.

Mr. F.C. Butler, first Editor of A.P.D.R., writes from Cambridge University concerning his recent visit to the Commonwealth Mycological Institute as follows:-

"Dr. Wiltshire appears to be very pleased with A.P.D.R. - intends to promote similar publications in the Colonies and publish from Kew a digest of articles from all sources. At Kew also looked over several recent C.M.I. publications - most impressed by Ainsworth and Sampson's 'The British Smut Fungi (Ustilaginales)' - the section devoted to the biology of the smuts is most comprehensive; by G. Watts Padwick's 'Manual of Rice Diseases' and by the 3rd (1950) edition of Ainsworth and Bisby's 'Dictionary of the Fungi'. Looked over the separates library comprising some 40,000 papers - any of these are available, on request, to Australian plant pathologists. Should C.M.I. not have any particular article catalogued, Dr. Wiltshire is prepared to locate a copy, microfilm it and send the microfilm by air-mail. Might add that C.M.I. is delighted that Australia has initiated a National Type Culture Collection - Hughes (in charge of Herbarium) is anxious to arrange an exchange of specimens and cultures as soon as possible. Kew has a collection of some 1200 cultures maintained for taxonomic

purposes, distribution to Universities and Colleges, etc. X-ray induced mutants of Neurospora spp. are also maintained for bio-chemical essay work. In connection with the maintenance of these Neurospora cultures, Dade has devised an ingenious and highly efficient micro-inoculation chamber, details of which I can supply if required. Sub-culturing is being cut down by the use of mineral oil - saw several cultures stored for 2 years after treatment and still growing happily and fructifying. Was interested to hear that P.D.A. is not considered a satisfactory medium for maintaining cultures. No single medium is used exclusively and, for the most part, cultures are grown on "starvation" media proved by trial to be most suited to their specific requirements - some used extensively are cellulose, rabbit dung and cornmeal agars. Screw-top bottles are preferred to test tubes - bottles are fitted with specially prepared rubber washers and media can be stored in them without deterioration for at least 7 years. A disadvantage is susceptibility to mite infestation. Might add that permanent preparations of all isolations are made for indexing with specimens received for identification - gum dammar and beeswax (see Mycol. Paper No. 27) are used for ringing purposes. Incidentally, Dade is experimenting with use of nail lacquer as a ringing agent. Uses 2 coats of Cutex Dark or Black Red, applied by camel hair brush - brush is kept pliable by immersion in ethyl acetate or acetone when not in use. Saw slides ringed in this fashion for 4 months and they looked perfect. In addition to Dr. Wiltshire and H.A. Dade, met S.J. Hughes, who has some 43,000 specimens catalogued in the Herbarium, Dr. Bisby and Miss Waterhouse. Miss Mason who was away because of illness."

C.M.I. LOAN FOR NEW BUILDING:

It was a recommendation of the 1950 C.A.B. Review Conference that a loan of £55,000 be raised to cover the capital cost of the new building for the Institute and that the servicing of this Loan be added to the C.A.B. Budget. So far, efforts to raise the money from banks or building societies have been unsuccessful.

RECENT C.A.B. PUBLICATIONS:

"The British Smut Fungi" by G.C. Ainsworth and Kathleen Sampson is available from C.M.I. for 20/- stg. The cost of "Manual of Rice Diseases" by G. Watts Padwick, in which available information on diseases of rice is brought together, is 30/- stg. One of the handiest C.A.B. publications is "C.A.B. List of Research Workers in Agriculture and Forestry in the British Commonwealth." The 1950 edition is now available in Australia at 13/2d. from the C.A.B. Liaison Officer, c/o. C.S.I.R.O. Information Service, 314 Albert Street, East Melbourne. C.2.

- C.J. MAGEE.